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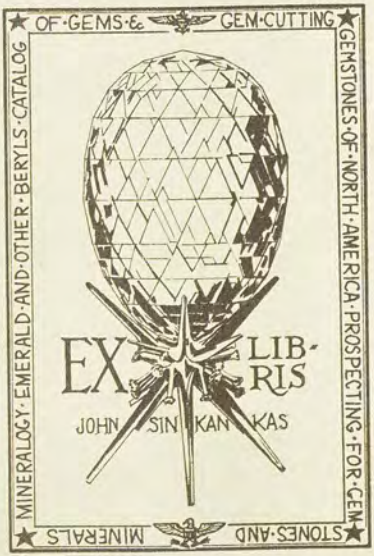

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PEARLS

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PEARLS

FROM the earliest times, pearls, on account of their natural beauty, not requiring the art of man to improve them, have been considered among the most splendid of gems.

The civilized and uncivilized peoples of all times valued pearls, for in the earliest Scriptures of the Hebrews frequent mention is made of them and history tells us that they were highly prized by the Greeks and Romans, who called them "Margaritae." Pliny states that pearls were not only used in enormous quantities for adornment by the wealthy Romans, but were ground into a fine powder and mixed with their wine, with the idea of giving it a better flavor. While the accumulation of pearls among the Greeks and Romans

was considerable, at the present day there are comparatively few of these in existence, and of little value for ornamental use, though nevertheless fairly well preserved.

Pearls, according to early Chinese records, were greatly esteemed, and used by them in the temples as well as for adornment. They believed that pearls acted as charms against fire and other misfortunes, and used them as a cure for mental diseases and stomach troubles.

Due to their possession of the rich pearl fisheries of Ceylon and the Persian Gulf, the people of India and Persia were among the earliest to collect pearls. And the Indian and Persian princes have been enabled to acquire large collections of them, which have never been equalled in any other country. Some of these

princes of India have been known to wear thousands of pearls and pearl ornaments, worth millions of dollars. In India in ancient times, the color of pearls worn was supposed to have the following effects on those wearing them: a blue pearl, good luck; a light yellow one, wealth; a white pearl, fame or glory; and one of dark yellow, a good understanding. Even with the early Egyptians, as well as Persians, pearls were popular.

Up to the Ninth Century pearls were chiefly used for ornamental purposes, but after this, for a period of about five hundred years, they were also prescribed for nearly every kind of illness. The smallest pearls were used to the greatest extent on account of their price, though the wealthy did not limit themselves to size. In Europe, the Crusaders developed to

an extensive degree the use of pearls for adornment, and they became very fashionable with the men as well as the women of that period, as much for decoration as ornament.

Up to the present time, the demand for pearls has increased continuously, and they often bring in individual quality a higher price, weight for weight, than any other precious gem.

OCCURRENCE

PEARLS of the finest quality are produced by the pearl mollusk, known as the Meleagrina Margaritifera, that inhabits the seas and rivers of many temperate regions. Having a shell from two to eight inches in diameter, this bivalve mollusk usually occurs in sheltered portions of the Indian Ocean and in some parts of the Tropical Zone of the Pacific.

Grouped like the common oyster in colonies, generally on the banks of coral twenty to thirty feet deep, it is attached by a byssus, which must be torn loose before gathering.

The pearl bearing mollusk is of a greenish black color on the outside, and its interior is lined with a beautiful silvery white nacre or Mother-of-Pearl, which in some degree bears the

lustre of the pearl. While the exterior of a mollusk may be covered with seaweeds or other foul, slimy matter of the sea, within where dwells their delicate bodies, it is always clean and beautiful. The pearl mollusk not only makes the interior of its shell lustrous and beautiful, but all other objects which come in contact with certain parts of its soft body.

This covering of foreign or other objects by nacre, which consists principally of a variety of calcium carbonate, is the process by which pearls are formed. The formation of a pearl is believed to be due to the irritation of the tender tissues of the mollusk, causing an abnormal flow of nacre or Mother-of-Pearl, which covers the object at first with a very thin coating, increasing its size with layer upon layer. Therefore, a pearl is an

accumulation of Mother-of-Pearl substance.

The nucleus of many pearls is a tiny grain of sand, a boring parasite, a worm, or even in some cases an egg of the mollusk itself. Only about one in thirty or forty mollusks is found to contain pearls, and this plainly shows that the formation of a pearl is an abnormal condition in the life of the oyster. This is so well understood among the pearl fishers that usually they only search for those mollusks that appear old, distorted, irregular and show signs of having been affected by boring parasites.

The origin of pearls, as explained and understood in early days, has very little weight with authorities of the present time, and while theories as to their origin have been confirmed in numbers of cases, at the same

time, science is unable to state definitely their every source of development. Most of the present day authorities seem to be of the opinion, due to much investigation, that in the greater number of cases the formation of pearls is caused by parasites or worms.

The Chinese, knowing the habits of the pearl mollusk to cover all foreign objects with pearl, have opened the shells and placed therein small images of their gods and beads, etc., which, upon closing, they return to the water to lie unmolested for some time. They are eventually taken out, and found covered with pearl substance, but not of the same beautiful lustre or color of the natural pearl.

The structure of the pearl, as previously explained, is made up of

numerous layers or coatings of microscopic thickness, of the same substance as the Mother-of-Pearl lining of the mollusk. These coatings overlap one another and the pearl's construction has the same appearance, when it is cut in two, as an onion. Due to this construction a fine pearl, is beautiful, complete and perfect, whether gathered when it is of the smallest size, or later when unusually large. With the exception of the nucleus, all beautiful pearls are made up entirely of coats of nacre, as is also the lining of the mollusk. Should a pearl be heated to any great extent these concentric coats would peel off and become separated from each other.

The many forms that pearls assume are due to their position in the mollusk, and also to the shape of the

nucleus. For example, pearls formed by different parts of the mantle of the oyster, often differ in appearance and shape; such as the spherical one, which is no doubt formed in the inside of the soft part of the mantle, as this perfect form of a pearl does not come in contact with any hard substance to interfere with the entire coating of its round surface. Should a pearl be formed by some boring parasite entering through the shell, then the pearl produced is liable to be of a wart-like appearance, known as a "Button Pearl."

Circumstances govern the number of pearls found in a mollusk, but it is only in exceptional cases that a great quantity has developed. A most remarkable case was a mollusk from the Indian Ocean containing eighty-seven pearls. As a rule, the greater

the number of pearls found in a shell, the smaller they are.

Next in importance to the pearl mollusk just described is the Unionidae Margaritifera, known as the fresh water pearl mussel, which produces beautiful pearls, but usually not of the value of those of marine origin. These fresh water pearl mussels are found in greatest numbers in the Mississippi Valley region and most always lie on sandy bottoms, in clear running water, anywhere from two to twenty feet deep.

PEARL FISHING

SINCE most ancient times, the fisheries of the coasts of Ceylon and India, the Persian Gulf and the Red Sea, have been and are the most important in the production of the Meleagrina Margaritifera or marine pearl mollusk. While there are many kinds of mollusks that produce pearls, the two most important are the one just mentioned, which inhabits the warm seas, and the other the fresh water pearl mussel of streams and rivers of America and other countries.

CEYLON

For a period covering a great many years, the Ceylon pearl fisheries have been very unreliable and uncertain, and the disappearance of mollusks from some of the banks forms one of the peculiarities of these fisheries. It

is stated that during a recorded period of one hundred years, there only occurred about thirty-six years of possible fishing. The pearl fishery in the Gulf of Manaar, on the North-west coast of Ceylon, lying immediately South of Adam's Bridge, is the most important in that region, not only on account of the fine quality of its pearls, but also for the great quantities found.

Until within the last few years, the British Government controlled the Ceylon fisheries, deciding at what time a fishery should occur, the extent and where the ground should be opened, by a previous examination. This official inspection is usually made the November previous to the fishing period of March and April (the time when the sea is the quietest), to determine what area may be

fished in, how many boats allowed, the number of days the fishing will last, and the approximate value of the pearls. This valuation is reached by the inspector's examinatien of the proposed area, which is attained by several boats containing divers, working from the center in circles, toward the boundary lines. The divers are sent down at intervals from these boats as they progress, to collect all the matured mollusks possible in each single dive; the ones between four and seven years old being the most productive.

Estimates are then made from over three hundred lots collected as to the number of pearl oysters within a given area, by counting those collected in so many square yards (which is about two or three). Not only is the number in the beds estimated

upon, but the approximate valuation and quantity of pearls found in each one thousand mollusks is reached by expert appraisers, after sorting and weighing. An exact valuation of pearls that a fishery will produce is often problematical, for there have been many cases where the returns have been much above the estimate.

If it is decided that conditions warrant a fishery, the result of the preliminary examination is published, with announcement of the area and fishing date, and the news travels very quickly throughout India, Ceylon and the East. This notice of the fishery is the signal for great preparation among thousands of persons in the surrounding country, who contribute to make up the multitude of fishermen, merchants, mechanics and laborers who attend.

Then some time, about the first of March, from thirty thousand to fifty thousand people gather along the water, at a point most convenient to the buoyed-off pearl oyster grounds. Here a town of about one square mile area springs up in a few days, with streets, houses, shops, markets, banks, postal and telegraph offices and other necessary buildings and departments, such as a town of fifty thousand would need. At the close of the fishery the place disappears as quickly as it grew into being, and that locality becomes a mere sand waste.

Most of the people assembled come from India, Arabia and Ceylon, and represent many tongues and at least a half a dozen religions. The town is not only made up of the previously mentioned people, who bear a legitimate part in the pearl industry, but

of gamblers, beggars, fakirs and low characters of both sexes, who are there to prey on the susceptible. They say that the dissolute make up about one tenth of the population.

Due to the short period for fishing, the work is carried on with greater strenuousness here than at any other fishery. The fishing boats, drawn up on the beach in a long line, are of every conceivable rig, from vessels that carry at least sixty-five men to small single-masted canoes, such as used in the East. The fleet of several hundred boats containing the divers and assistants, leaves its moorings some time after midnight, in order to be at the fishing grounds, ready for work, at sunrise. A signal to start fishing is given from the guard boat about six a. m. and also

at twelve noon, when the day's fishing is supposed to end.

The divers, who are naked, except for a loin cloth, protect their fingers from the rough shells and coral, by wearing soft leather shields. To facilitate the diver in his descent, a stone weighing anywhere from thirty to fifty pounds, according to the weight of the man and the depth to be used, is hung about four to five feet below the surface of the water, from a pole or outrigger. On the rope, just above this stone (which is attached by means of a hole through its center) a loop or stirrup is made in which the diver places his foot.

When prepared to descend the diver grasps the rope, with the stone attached, places one foot in the loop, just above the stone, and the other foot on the rim of a net basket sus-

pended from a rope, inflates his lungs with a deep breath, loosens the slip knot which controls the dropping of the stone, and sinks as quickly as possible to the bottom. At once withdrawing his foot from the stone, he quickly crawls around the ground, tears as many oysters loose as are within his reach, puts them in his basket, and signals his watchful helper, or "manduck" to pull him to the surface, which ascent is hastened by the diver drawing himself up hand over hand.

The assistant draws up the net basket and sorts over the contents, throwing back into the sea such refuse that is bound to be gathered indiscriminately in so short a working time. As the divers work on shares, the "manduck" keeps each man's catch separate. Generally

there is one attendant and one diving stone for two divers, the diving occurring at intervals of five or six minutes. Most of the best divers take very good care of themselves while at work, drying their bodies after each descent and allowing time for necessary rest. The usual time spent below the surface is from sixty to seventy-five seconds, and the average number of oysters on good ground per man, per dive, is twenty-five to thirty-five, according to the ease with which they are collected.

At the end of the day's fishing, the fleet makes as quick a return to the shore as possible, although, due to adverse winds, they are often delayed considerably. It is said that whenever the return trip is long enough to allow, the divers and assistants take advantage of it to open mollusks

and conceal any pearls found. The Government has discovered that it is impossible to entirely suppress this looting, which has amounted at times to almost a fourth of the catch.

When the boats are beached, the oysters are taken out at once and carried into the thatched bamboo enclosures of the Government, divided on the inside into square pens, each marked with the corresponding number of a boat. There, after sorting their catch into three piles of the same number, the diver, on receiving his one third from the agent, divides with his helper and those who provide the boats.

On passing out of the Government enclosure, the divers are immediately surrounded by crowds of natives, eager to purchase oysters in small quantities, for the spirit of specula-

tion runs very high, every person being anxious to test his fortune to some degree, at least, as the opportunity is the same for all. The natives may buy one or a dozen or more as they wish.

At the end of the day the two thirds share of the Government is sold at auction and disposed of in lots of one or more thousand only.

Those who buy the pearl oysters in small numbers usually open them with a knife to search for pearls, but buyers of large quantities have them deposited in a private enclosure, where they lie in the sun and rot for about ten days. At the end of that time a thorough decomposition of the soft part of the mollusk allows the pearls to be washed from the filthy mass. Most appalling is the stench from the rotting oysters, and

for this reason they are kept on the outskirts of the town.

For lustre or "orient" and also spherical regularity, the pearls of the Ceylon excel those of any other fishery. Of a silvery white color, as a rule, the majority weigh less than two grains, anything between that weight and ten grains being considered quite large. Due to the utmost care and method in obtaining pearls, the Ceylon fishery has always been the greatest producer of the seed pearl, also the very minute ones, of no value for ornamental use, which are sold in India to be ground up for chewing with the betel nut.

At the present day these fisheries are under the control of an English syndicate, leased by them from the Government, and no new methods for working the grounds have been

introduced, as there has not been a fishery for several years.

GULF OF PERSIA

The banks in the Persian Gulf have been operated since the earliest recorded times and are undoubtedly the most important and valuable on account of their annual yield, which is not uncertain like that of the Gulf of Manaar. The oyster reefs are distributed all over the Persian Gulf but are most productive along the Arabian side and near the Bahrein Islands. They are worked a good part of the year by the Arabs, who fish where and when they please, without allowing any interference, employing the same methods for collecting the pearl mollusk as those in Ceylon.

It is estimated that thirty-five hun-

dred boats and thirty-five thousand men are employed, comprising Arabs, who are the divers, Hindoos, Negroes, and many others from nearby countries.

Usually the Indian traders from Bombay, the pearl market of the East, supply the capital for equipment, food, etc., taking advantage of this to buy the pearls in large lots at their own price, at the expense of the poor diver whose profit is reduced to almost nothing.

Pearls from the Persian Gulf have more of a yellow tinge in comparison with the white ones of the Indian Ocean and the mollusk is about twice the size of that of the Ceylon fisheries.

THE RED SEA FISHERIES AND OTHERS

While by no means as extensive as

the Ceylon and Persian Gulf fisheries, those of the Red Sea have yielded pearls for at least twenty-five hundred years. The banks seem to be scattered over most of the Red Sea, excepting the Southern part, and are worked in the Spring and Autumn in about the same manner as those previously described. Here also, as in the Persian Gulf, the men who control the fisheries are sole masters of the situation and the poor fishermen, who come under their command are badly treated. The Red Sea fisheries are not at the present day as productive as they have been in the past.

Pearl oyster banks occur in many other parts of the World beside those just mentioned, such as the coast of China, Gulf of Aden, the Malay Archipelago and the coast of Australia.

The last named produces the largest pearl mollusks known, in which are found fine large pearls. These mollusks sometimes measure twelve inches in diameter.

On the American Continents the pearl mollusk is found off the coast of Venezuela, in the Gulf of California, and off the coasts of Mexico and Panama. Black pearls have been a specialty of the California fisheries for many years.

The fresh water pearl mussel, though secondary in comparison with the marine pearl oyster, nevertheless produces pearls of good quality. It has been estimated that one pearl is found in every hundred mussels, and only about one percent of these are much above the average. The pearl mussel, while inhabiting rivers and streams in all parts of the

world, is found in greater quantities in temperate countries.

It is in North America that the Unionidae are most abundant, particularly in the basin of the Mississippi and some of its tributaries. This locality has supplied many of the baroque or irregular pearls used so much the last fifteen years. Here the search for pearls is carried on by persons out of regular employment who have no one systematic method of collecting the pearl mussel.

In some localities they are gathered from the bottom of the stream, with an iron rake, in others by dredging, and in shallow water by treading them out, using the bare feet to discover where they lie.

As in the case of the marine pearl oyster, it is useless to attempt to find

pearls in any but abnormal and distorted shells, although it is said that in Arkansas, pearls have been found lying loose in the streams.

HARDNESS

THE pearl is not only identical with Mother-of-pearl in structure, but also in composition, hardness and specific gravity. In composition it consists principally of aragonite, a variety of carbonate of lime. Due to its composition, a pearl dissolves readily in acid, to such a degree that nothing is left but a dead lustreless pearl-like mass.

The hardness of pearls is only between three and four in that scale in which the diamond ranks as ten. Pearls which are strung together poorly are affected by constantly rubbing against one another. When outwardly marred the outer laminated coating can sometimes be removed exposing another layer almost as good as the first, although slightly

different in color. This is an operation, however, that requires the greatest of care by the most skilled artists, and even then is rarely a complete success.

Pearls which are unusually lustrous are said to be somewhat harder than the more ordinary specimens. Black pearls are the hardest of all, and when particularly fine are almost as valuable as the fine white ones.

COLOR AND LUSTRE

ALMOST every color of the rainbow is met with in pearls, their color having an important bearing on their value. Those for ornamental use are mostly white, yellowish white, pinkish or bluish white, and partake of the color of the Mother-of-Pearl layer in the shell in which they are formed. These colorings, to meet the standard of quality most in demand, must have a rich warm tint, as only such are becoming to everyone. Pearls of reddish brown, blackish gray, yellow, pale blue, light and dark brown, rose red and the beautiful black color, are found in both continents.

The Hindoos, Chinese and other peoples of Asia prefer the ones of a decided color, yellow especially be-

ing highly prized. This is because they regard them as less perishable, due, they imagine, to a greater hardness.

Usually Unios, or fresh water mussels, produce pearls of almost every color. Those found in Wisconsin are noted for their many colorings, lustre and beautiful appearance.

LUSTRE

The lustre, or "orient", as it is called, that soft irridescent glow of a pearl, is the chief characteristic, combined with the color, that makes it beautiful and therefore valuable. Individual pearls differ considerably in lustre; those formed by the marine mollusks are as a rule superior in this quality to the pearls formed by the fresh water pearl mussel, and those lacking a good lustrous surface, no

matter what their color or shape, are never classed among pearls of fine quality.

It is the lamination of the surface, as well as the quality of the nacre in its construction, which is responsible for the pearl's lustre. The partly transparent but very translucent layers near the surface allow some light to pass through, which is again reflected outward from the deeper layers. This light, combined with that reflected from the outer surface, produces the impression called a "pearly lustre". The thinner the laminae the more beautiful the lustre and naturally the more valuable the pearl.

Where the outer nacreous layer of a pearl is dull or slightly discolored in a spot, affecting the lustre, it can sometimes be peeled off, the next layer exposed being in good condi-

tion, and possessing a lustrous surface. This of course, reduces the size of the pearl somewhat.

It is said that in Ceylon the natives feed pearls, which have become dull for one reason or another, to chickens. After lying in the bird's crop for several hours, where the movement and friction is supposed to restore the lustre to some degree, the fowl is killed and the pearl removed.

WEIGHT, VALUE AND FORM

PEARLS are sold by their weight in grains rather than by carats, four grains being equal to a carat. Perfectly round pearls range in weight from the fraction of a grain to more than three hundred grains, but anything with a fine lustre is most rare weighing above one hundred, and these are called "paragons."

Special terms are used for pearls of particular sizes; for instance, those about the size of a cherry are termed "cherry pearls," and those not too small to be handled and dealt with separately, each exceeding twelve grains in weight, as "piece pearls." The "seed" or "ounce" pearls weigh less than one half a grain, and are sold in ounce packages. Then there is still a smaller size called "dust

pearls," which are too small for ornamental use.

In the East, pearls are grouped into ten different sizes, which is accomplished by running them through about nine sieve-like baskets, each one with different size holes; the first having the largest holes and the others graduating down to the smallest. Then the ten lots of different size pearls are sorted over and classified according to quality, lustre and shape, by an expert appraiser.

On the next page are some cuts of approximate sizes of pearls, to convey an idea of the different weights.

VALUE

The value of fine pearls is quite comparable with that of the costliest gems worn, and has advanced greatly in the last ten years, due to the

1 Grain

2 Grain

3 Grain

5 Grain

6 Grain

7 Grain

8 Grain

10 Grain

12 Grain

14 Grain

18 Grain

22 Grain

increasing demand, as they seem to express more and more luxury, beauty and refinement. The woman of rank and wealth today values first among her jewels her necklace of pearls.

As in the case of precious stones, the value of pearls varies with their size, form and the general beauty of their appearance. The more perfect the form of a pearl, the more valuable does it become, for other things being equal, a pearl of irregular form is worth considerably less than one which is perfectly regular.

A pearl of the so called "first water" must possess beside a symmetrical form a smooth surface and a perfect "orient." It must be free from all blemishes and fractures, very translucent and possessed of a fine white color. Some pearls of deep color, showing a beautifully fine

lustre, are as costly as those of purest white. The lack of "orient," no matter how perfect the form or beautiful the color, makes a pearl comparatively valueless.

Large or beautiful pearls are not subject to any fixed prices, for the degree of color, "orient" and form has all to do with its valuation.

The price of a string of carefully selected pearls depends entirely upon its color, size, quality, form, and the length of time necessary to collect it. This often takes years to accomplish. Many women of today, after acquiring the average length necklace, increase its beauty and value by adding another pearl every now and then.

One should be most careful in pearl buying and do the selecting in pure daylight. Also, it is always

wise to know your dealer in such transactions. In some shops, particularly in Europe, the locality used for examination of pearls by customers is furnished with curtains and hangings of many colors and illuminated by a very soft or artificial light. This is most helpful when the dealer has imperfections or a certain lack of lustre to hide.

FORM

Many are the forms of pearls produced by the mollusks, some of which are most fantastic, resembling insects, animals, fruit and even men. These and numbers of other forms are the irregular or "baroque" pearls.

Among the regular forms used and valued today, besides the spherical, are the following:

Pear shaped, which has a form like a pear.

Button: a pearl that is nearly round, having a flat or convex back.

Drop shaped: a long pearl somewhat like a spear head in form.

Then there are others which are irregular, such as:

Petal pearls: having the appearance or shape of a petal or leaf, flat and more pointed at one end than at the other.

Wing pearls: somewhat resembling a wing.

Dog tooth: a long narrow pearl, with one end slightly pointed.

DRILLING OF PEARLS

THE drilling of pearls for mounting or stringing is a most delicate operation, as it is so easy to injure their surface. While modern machines are used considerably nowadays, drilling is still successfully done in Oriental countries with the bow or fiddle drill. This is a piece of wood or steel, with a very strong cord stretched from end to end, tight enough to bend it into the appearance of an archer's bow. By wrapping the cord around the grooved edge of a brass disk, which holds the drill in its end, the same is made to rotate by moving the bow up and down. The drill must, however, be revolved with almost perfect regularity, for fear of cracking the pearl's surface.

The pearl to be drilled may be held in the hand or by small forceps, having at the end a round cup-like holder lined with chamois. These special forceps are made with cup-like ends of different sizes, for large or small pearls and have a hole through the cup to allow the drill to penetrate.

In preparing to drill a pearl, a pair of calipers is generally used, with some coloring substance on its ends to mark the drill holes exactly opposite each other. Then placing the drill against the pearl in its holder, at the spot marked, the bow is moved up and down, not too rapidly until drilled half way through, after which the pearl is turned around and drilled from the other side as marked, both holes meeting in the center,

thus preventing any cracking in the surface.

At the present time, a number of first class jewelers drill pearls and modern methods are so perfected that there is no occasion for cracking or damaging a pearl. The work is done on a small specially constructed, motor-driven lathe, which revolves the pearl at a high rate of speed. The pearl is placed in a small cone shaped vise, called a "chuck", which, from the apex down to its flat surface, is split evenly in three parts, to allow the pearl to be gripped in the socket in the center of the flat surface of the cone.

In the make-ready, the cone shaped "chuck", as it is drawn into the lathe by a thumb screw at its other end, binds the pearl little by little, until the proper tension is

reached to hold it tightly without damaging its surface. There are quite a number of "chucks" that make up the equipment of the lathe, each having a different size socket to suit any pearl from a quarter of a grain in weight upward. The operator, after starting the motor, places his largest drill in an arm, (which acts as a guide and steadier) opposite the pearl and advances this drill by hand just deep enough into the pearl to penetrate the outer surface. After this he drills with a finer and more delicate one, withdrawing it every few seconds to prevent the drill from overheating.

This process, you will note, is just the opposite from the old way previously described, as the drill is held stationary and steady, while the pearl revolves. The revolving of the pearl

at a great speed, erradicates any chance of cracking its surface, and allows it to be drilled straight through, therefore making the hole accurate and at the same time small.

The holes made are always very small, as the making of them means a loss in weight, and this would be quite an item in the case of an exceptionally fine pearl.

STRINGING

MOST skillful and deft is the process of stringing pearls, much more so than one would think. The silk thread used must be of the purest, without dye, and as strong and fine as possible. After the first pearl is tied to the clasp, by means of a knot, the thread is then run through the next pearl and between that and the one following a knot is tied; thereafter knots are tied between the second, third, fourth and fifth pearl, in making up a necklace, to prevent any great loss should the silk thread break.

Necklaces which are worn very much should be restrung every little while, as in time the thread stretches and the necklace has the appearance of being minus a pearl here and there.

Pearls, particularly fine ones, should be given as much care and attention as would be devoted to a rare piece of old lace or other valuable ornament, wiping them every now and then to remove dust or perspiration.

PEARL COLLECTIONS AND NOTED PEARLS

STANDING out most prominently among the wonderful collections of pearls in India is that of the Gaikwar of Baroda, that progressive and enlightened prince of India.

In this collection, most of which was gathered together by his predecessor, is a sash made up of a hundred rows of pearls, with a large tassel of pearls and emeralds at its end. Also, among the treasures, are seven rows of superb pearls, worth about a half a million dollars, a litter covered with seed pearls, and greatest of all, the most valuable jewel ornament in the world, a shawl or rug of pearls, about ten feet long

by six feet wide, made up of strings of pearls and said to be valued at several million dollars. The center and border of the shawl are also set with diamonds.

Another prince in India, the Rajah of Dholpur also possesses a magnificent collection, among which is a necklace of about eight strings of the most superb pearls. It is said that this necklace is the finest in India and worth millions of dollars.

THE SOUTHERN CROSS

Most curious is that cluster of pearls known as "The Southern Cross", which is made up of nine pearls in the form of a Roman cross, about one and one-half inches long. The upright standard is composed of seven pearls and the arms are made up of one pearl on each side of the

second pearl from the top. These pearls are not perfectly round but are all flattened somewhat against each other where joined, and all have a slightly flat surface on one side of the cross. While the lustre is good, nevertheless, this curiosity would not bring a very big price were the pearls separated and sold as irregular ones. It was found off the Northwest coast of Australia in 1883, and it is said that when originally discovered it was in three pieces, comprising eight pearls. At that time another pearl of exactly the same form, etc., was procured and added to its length to make the cross of better proportion. Before placing it on the market the different parts were joined together with diamond cement and it has remained intact ever since.

THE HOPE PEARL

This, one of the largest pearls known, was originally in the collection of Henry Philip Hope, of London. Of irregular form, it is about two inches long and weighs in the neighborhood of 1800 grains. It is somewhat of a pendant shape and its lustre, as well as its color, varies. The upper part of the pearl is of a fine white lustre, which gradually changes to a dark greenish tint at the lower end.

THE VAN BUREN PEARLS AND OTHERS

The Van Buren pearls were sent to Martin Van Buren, President of the United States, in 1840, by the Iman of Muscat. This gift comprised two pendant pearls of about thirty grains

and a fine necklace of one-hundred and forty-eight pearls, the total weight of which is about seven hundred grains. During the last few years these pearls have been in the possession of the National Museum.

One of the finest pearls discovered in this country is that spoken of as "The Paterson" or "Queen Pearl". This was found in Notch Brook near Paterson, New Jersey by a man named Quackenbush, about the year 1857, and was sold for fifteen hundred dollars. Today it is worth approximately fourteen thousand dollars.

About the finest collection of black pearls in Europe is that of the Duchess of Anhalt-Dessau. These took centuries to collect, and are heirlooms of that family, each member being morally bound not to sell any of them unless as a last resort.

The Nordica pearl, which takes its name from the noted prima donna, having been purchased by her, is a fine pearl of greenish color, weighing one hundred and seventy-five grains. Of a drop shape, it was worn as a pendant in Madame Nordica's necklace of colored pearls.

Most interesting is the Morgan collection of American pearls, at the American Museum of National History of New York. It is composed of about nine hundred pearls of every color and form, and includes not only those from our inland waters, but also those from the Gulf of Mexico and the Pacific and Atlantic Coasts.

THIS BROCHURE ON

Diamonds

Gives briefly their chief points of value, sets forth our facilities and our competency for supplying the finest specimens, and explains our methods of purchase and classification

MARSHALL FIELD & COMPANY, CHICAGO

REAL VALUE IN THE DIAMOND

TO the splendid individual beauty of the Diamond is due in great measure the universal esteem in which it is held.

The Diamond is a natural form of carbon.

When well proportioned and polished, its refractory powers are wonderful—unlike those of any other known substance.

In its natural state, it possesses little of this remarkable attraction, but its hardness and density make it susceptible to an incomparable finish. Futile attempts have been made to imitate this lustrous quality and though many future experiments may be made, successful

reproduction of the Diamond is highly improbable.

Many of the famous gems are very old, their exact origin being unknown, yet they retain their original color and brilliancy.

The endurance of the Diamond and its ever increasing value, gives it a place among substantial investments.

DEMAND AND MARKET VALUE

The increasing value of the Diamond is due to the growing appreciation of its natural beauty and its inimitable properties. Although new fields are occasionally discovered, and the yield of mines increases owing to improved methods of production, the demand for the

finer qualities is in excess of the supply.

The stability of Diamond values is best shown during periods of depression. Even in the most unsettled market conditions, prices have not weakened.

GRADATION OF VALUES

In the selection of all our Diamonds they are carefully examined and classified according to authoritative standards.

Through this exacting classification we know that the individual stone is priced upon the basis of its true value.

Color, brilliancy and perfection are dominant factors in determining the worth of a

Diamond, but the distinctions are very finely drawn.

The color classification comprises the following important divisions. Each of these may be also subdivided into several classes:

Brown: Stones having a strong brown tint—the lowest in commercial value.

Yellow: Stones possessing a decided straw color—next in value to the Brown Diamonds.

Slightly Brown: Well cut Diamonds of this class often appear white, especially when mounted or viewed from the surface. A marked brown color, however, is revealed upon closer examination.

Slightly Yellow: A faint straw color distinguishes Dia-

monds in this division. Like those slightly brown, when mounted, they are frequently mistaken for white Diamonds. They are superior to the lower grades, especially in their clearness and brilliancy.

Standard White: These Diamonds possess a clean, white color. When perfectly cut they are very brilliant. Although a number of unmounted stones grouped together show a suggestion of color, they are usually sold as white and frequently as pure white.

Pure White: A clear water white, which by many is regarded as blue white or blue, is the notable feature of this grade. When mounted or viewed from the surface these stones often show a steel blue tinge. When

correctly proportioned their brilliancy exceeds any of the lower grades.

Blue White: Diamonds of this grade are cut from fine blue white stones. When the light is allowed to pass through them they show a beautiful clear blue tinge. The blue tints are greatly intensified under artificial light. The greatest brilliancy possible in the Diamond is attained in this and the following Grade.

Extra Blue: These are Diamonds of the finest quality and are obtainable from but few dealers. To a discriminating buyer this grade is most attractive—every stone being a real gem in color, material, perfection, cutting, proportion and finish.

Rare Colors: Fine canary, rich brown, green, red and other unusual colors are sometimes found in Diamonds, but as a rule their value does not compare with those of the bluish cast. Occasionally very rare, fancy blue stones are shown but at exorbitant prices.

The terms used in classifying these various grades are sometimes misapplied by others, and for this reason an examination is necessary before price comparisons can be made.

BRILLIANCY

Perfect cutting and finishing—absolute essentials to its beauty—are important elements in the expense of the finished Diamond. The degree of brilliancy is almost wholly dependent upon the care with which this work is done.

A perfect "Brilliant" Diamond is cut with 58 facets, of which the table or top is the large flat surface. There are 32 facets above the girdle and 25 on the back or under side, including the apex. It should be perfectly round and have thin, well finished edges. The proportion and relative angles of these facets are figured to perfection, with only one object in view—development of the maximum light refraction and brilliancy.

It is found that a stone cut in this way is more valuable and has a much larger surface than one cut too deep, or when attractiveness is in any way sacrificed to weight. On the other hand, a stone cut very shallow to gain a large spread

is undesirable, as it lacks brilliancy.

Much of the intrinsic value of a stone being in its weight, many cutters, in order to produce the greatest possible weight from the rough stone, will allow it to come out poorly proportioned and imperfect in the cutting.

The Diamond's chief value to the wearer lies in its beauty and it is essential that the purchaser make a comparison of stones as well as a comparison of weights and prices. It frequently is found that of two stones, the one of lesser weight, perfectly cut, appears larger and more brilliant and is consequently more desirable.

PERFECTION AND IMPERFECTION

There are innumerable degrees of imperfection. Diamonds may be divided under this head into five general classes. With the exception of the commercially perfect and absolutely perfect these classes have many subdivisions.

Very Imperfect: These stones are badly cracked, have chips, streaks of color and hazy spots, or, they contain much uncrystallized carbon.

Imperfect: Under this classification come the slightly cracked, slightly chipped and poorly polished stones, also those containing more or less carbon, bubbles and the less noticeable imperfections.

Slightly Imperfect: These stones have imperfections so slight as to be practically invisible, especially if viewed from the surface.

Commercially Perfect: These Diamonds are generally regarded as perfect. The imperfections can be discovered only upon examination with a strong glass and are never discernible to the naked eye.

Absolutely Perfect: These Diamonds are not only without flaws and imperfections, but are perfectly cut and proportioned—each facet being mathematically correct. Even a minute variation in this thickness of the edge is considered, by us, an imperfection in the cutting and is sufficient to place the stone in the next lower class.

This term, we are aware, is often improperly used and generally because stones sold as absolutely perfect have not been thoroughly examined.

Imperfections in a Diamond are usually indiscernible to the unpracticed eye, and it is quite improbable that a purchaser would be able to judge the degree of perfection or imperfection accurately.

CONCERNING OUR VARIETIES

It will readily be seen that the most desirable stones are to be found in the Standard White, Pure White, Blue White and Extra Blue Series, and in the slightly imperfect, commercially perfect and absolutely perfect

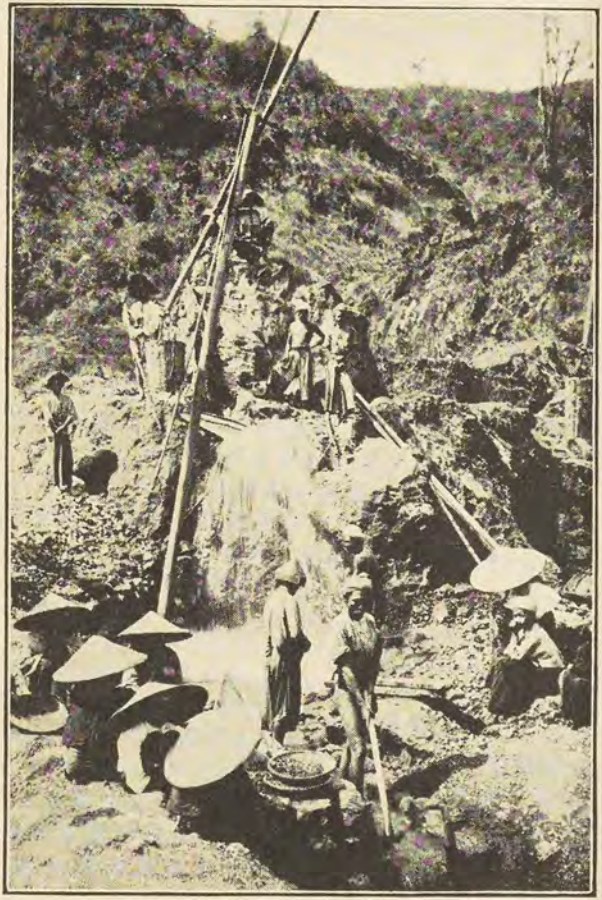
grades, that scientifically cut stones possess advantages in size for weight, brilliancy and general appearance, which can be obtained in no other way.

It is our belief that strict adherence to the correct standards of cutting, and the maintenance of the superior qualities, outlined above, are largely responsible for our success in the Diamond trade. The strength of this success lies in the uniformly right prices which prevail throughout our stock, and in the integrity back of every Diamond we sell—a positive assurance of value.

Special attention is directed to the high merit of Diamond Jewelry produced in our own workshop. We are admirably equipped for the execution of

all special order work. Original designs will be submitted or ideas developed from the customers' own suggestions. In the making of such pieces we assure the finest execution.

MARSHALL FIELD AND COMPANY



Crude Native Method of Washing the Ruby Laden Gravel, in the Rich Mines of Mogok, Upper Burma.

SAPPHIRES
EMERALDS
RUBIES

SPAULDING & CO.
(INCORPORATED)
GOLDSMITHS, SILVERSMITHS AND JEWELERS
MICHIGAN AVENUE & VAN BUREN STREET
CHICAGO
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PHILADELPHIA

CORUNDUM

The mineral corundum, chemically pure alumina, the oxide of the much-used metal aluminum, includes some of the most valuable and beautiful precious stones, among which of the greatest importance is its blue crystalline variety, the sapphire, and the red, the ruby.

While corundum is somewhat brittle, it possesses the characteristic of hardness to a great degree, being number nine in Moh's scale, and therefore with the exception of diamond the hardest gem mineral known. Like diamond, too, it is

impervious to acids. There are, however, degrees of hardness among the different varieties of corundum, the blue sapphire ranking first.

Corundum of all colors is used for gems, provided it is clear and transparent; the proportion found possessing these qualities is very small. Some of the cloudy or opaque varieties are utilized for pivot supports of watches and delicate instruments. The common or dark variety known as emery, also commercially called corundum, is very valuable for abrasive purposes.

In order to signify the possession of special qualities, such as hardness, color and fine lustre, the two varieties which occur frequently, sapphire and ruby, are distinguished by the prefix "Oriental." The use

of this prefix serves to separate, in the case of the sapphire, stones of the true sapphire blue from other color varieties of corundum, and no doubt originated in early days when the rarest gems reached Europe by way of the Orient.

That small quantities of chromium, and also iron, are responsible for the beautiful coloring in corundum is the prevailing opinion of scientists, while the fine blue of the sapphire is often attributed to organic matter. The "Oriental" varieties of different colors of corundum generally appear as beautiful when seen by artificial light as by daylight.

Having briefly considered some of the characters common to all corundum, we pass to its most valuable variety, blue sapphire.

Sapphires.

The word "sapphire," which means blue, is of the same form in nearly all the early tongues, such as Greek, Latin and Hebrew, thus showing that this precious gem was no doubt in use by the ancients. The supposition is, however, that this word was employed to describe lapis lazuli, before the discovery of blue sapphire.

Sapphires occur in most localities as secondary contact minerals which have been developed in limestones, and it is in the limestones and weathered débris from these rocks, covering the sides and bottoms of many hills and valleys, that the gems are found.

By far the largest number and finest quality of sapphires that come

into the market are from Siam, the production of other countries being quite small in comparison.

The earliest sapphire mines worked seem to have been those in the vicinity of the town of Chantabun, on the Gulf of Siam. Up to the present time the most important of the long-known mines of Siam are those of the district of Bo Pie Rin, in Battambang, which have been estimated as producing almost two-thirds of the world's entire sapphire supply.

In this locality sapphires are found usually about two feet below the surface of the ground, in a somewhat sandy clay. The most important mines are situated in the sides and floors of the Pailin valley, and consist of rough pits about five feet square and five to twelve feet

deep. From the excavated mass from these pits the clay is washed and the stones are picked out of the sandy residue.

While the mines of Siam have grown most rapidly in importance it is only since about 1876 that they have been worked with any regularity. The occurrence of sapphire in Siam was known, however, in the early part of the nineteenth century.

Stones from this country surpass, as a rule, those from all other localities in their velvety lustre and intense blue color, some of which are so deep that at times they appear almost black.

Sapphires occur in Ceylon in the sands, gravels and clays formed by the weathering of the mother-rock and accumulated during long periods of time, in the beds of streams, and

on the sides of hills above the present high-water level. Although these gem gravels furnish many sapphires, some of which are of a rich color, nevertheless in quality and color the majority do not compare with those of Siam. In the principal mines, situated at Rakewanna, Ratnapura and Satawaka, sapphires are found with other precious stones.

Another important locality in which since 1882 large numbers of sapphires have been found, is the Zanskar range of Kashmir, in the northwest Himalayas. The natives of this district, attracted by the fine blue color of the sapphires, and not realizing their value, often used them for striking fire, but when their value became known the exact location of these finds was for a long time kept a secret, first by the orig-

inal discoverers, and afterwards by the Kashmir government. Many beautiful sapphires of fine color and velvety lustre have been obtained in this section of India.

The occurrence of sapphire in Burma is practically the same as that of ruby, being found in the sands and solid rock frequently with ruby, but here only about one sapphire is discovered to 500 rubies.

Burmese sapphires are usually dark in color. While the production from the Burma mines is somewhat small, nevertheless very large sapphires have been found, one of which, of excellent quality, weighed 79.51 carats. Then, again, that noted sapphire of about 951 carats, seen in the treasury of the King of Ava, was reported as having been found in Burma.

The methods at the Burma mines and the conditions under which the precious stones are found, will be dealt with in greater detail in the chapter on rubies.

Australia has produced a number of sapphires, found in many instances with diamonds in the gold sands of that country.

Among other localities contributing quite a large quantity of these gems to the market to-day is the district about twelve miles west of Helena, Mont., U. S. A. The other district in the United States noted for sapphires lies in the western portion of North and South Carolina. All varieties of precious corundum are found there.

As previously stated, sapphire is the hardest variety of corundum, and with the exception of diamond,

the hardest gem known. It is this characteristic that makes it so impervious to wear, thus protecting its wonderful velvety lustre and beautiful color. This degree of hardness also insures its sharp edges and corners against years of use. The Montana sapphires are said to be unusually hard.

The color, particularly, is most essential in regulating the value of a sapphire. Every shade of blue from the palest to the darkest is represented. Those with a very dark shade of blue are often described as "inky," and called at times "masculine," while very pale stones are known as "feminine," or "water" sapphires. The deeper a sapphire is in color the more highly is it prized ; provided the depth of its color does not interfere with its

translucency. Deep-color stones are often given the name of "lynx" or "cat" sapphire.

Many are the varieties of color, as well as shade, known among these gems, those of the greatest importance being Indigo blue, Berlin blue, corn-flower blue, smalt blue, grayish blue and greenish blue. The most admired tone of color is an intense corn-flower blue. This, when combined with a beautiful velvety sheen or lustre, is of great value. Smalt blue is also of first importance. It is from Siam that the great majority of gems of corn-flower blue have been obtained.

There is a variation in the appearance of some sapphires in artificial light ; for instance, the color may become slightly darker, or change to purple or violet. Stones

having a tendency towards this latter color are as a rule less valuable.

The prevailing opinion that organic matter is responsible for the beautiful blue of the sapphire is due to the fact that this color disappears when the stone is heated to a great degree.

Certain specimens of sapphire exhibit when polished a six-rayed star, which appears on the basal plane as beams of light radiating from the center. Stones with this characteristic are known as "asterias," or "star," sapphires. The appearance of this star is best displayed by cutting the sapphire in which it exists, *en cabochon*, the center of the curved surface lying in the axis of the crystal. The rays of the star are affected by the movements of the

stone, which they follow, to a certain extent, as their center is always directed towards the light.

A sapphire with a perfect six-rayed star sharply defined is less frequently seen than with a patch of soft, shimmering or opalescent light, which may be more or less rounded or elongated in form. Stones showing only an irregular spot of opalescent light are known as "cat's eye" or "opalescent" sapphires.

The stellate phenomenon of star stones has been variously explained, but the most probable explanation is that it is brought about by the reflection of light from the surface of numbers of small tubular cavities or rifts in the crystal. From the surfaces of these tubular cavities, arranged parallel to the six sides of the

prisms, the reflection of light produces the six rays of the star. Star sapphires are never quite clear and transparent throughout, and rarely possess a fine deep blue color, it being more of grayish blue or gray.

In cutting sapphires the different forms of plane surface cuttings of the diamond are used, such as brilliant, rose, pendeloque and briolette (double rose cut), *en cabochon* and step or trap.

The brilliant form, which is said to have originated with Cardinal Mazarin, is the most frequently chosen, since it displays the beauties of the stone to the best possible advantage. This usually consists of about fifty-eight facets, thirty-three on the upper and twenty-five on the lower part of the stone, divided by a line or girdle.

In order to increase the transparency of the sapphire it is cut thinner and flatter than in the case of the diamond. The clear blue color of the crystal is best displayed when the table of the cut stone is perpendicular to the optic axis and parallel to the basal plane of the crystal.

The practice in the Orient is to cut stones *en cabochon*, that is, with a rounded surface, before they come upon the market, and when the beauties of the stone are not brought out to the best advantage it may be recut. This rounded form, cut more or less steeply, is the only one suitable for displaying the six-rayed star, characteristic of some sapphires.

Owing to the strong refraction of the sapphire, the rays of light which

enter the stone by its upper facets are reflected by the lower facets and pass out by the front of the stone, the fine blue color having been imparted to them during their passage through it. It is this coloring of the rays of light combined with the beautiful lustre of the stone which makes the sapphire so effective.

The method of changing the rough to a well-cut stone is precisely the same as that used for the diamond, the facets being lightly marked out on the stone before embedding it in an alloy, at the end of its holder. Pressing the stone against the revolving metal grinding disc by means of weights, to increase friction, the facet is ground down and polished by the use of diamond dust. Great care is employed in this work that the facets

may be all evenly laid to bring out the best possible qualities of the sapphire.

There is at times quite a loss in cutting large and somewhat cloudy crystals, as the small portion which is clear and transparent must be carefully cut away by the lapidary, to be transformed into a gem.

The carat is the weight used as a unit of value for sapphires and other precious stones. It is about one-fifth of a gram, and was for years divided into sixty-fourths for weighing purposes, expressed by a number of common fractions, but in July, 1913, this was changed from fractional to metric or decimal carats, in order to simplify the division and make it universal.

In early times the sapphire was considered an antidote for poison,

the supposition being that it had the power of killing a poisonous spider if put in water with it. Another use was as a remedy for fevers, by placing the stone on the heart or soaking it in vinegar, and administering this extract.

From the earliest traditions we learn that the sapphire, with its beautiful pure blue color, was the personification of all that was good, rendering the wearer chaste, virtuous, devout, wise and a recipient of heavenly favor, which no doubt had some influence in making the stone of first importance for ecclesiastical jewels ever since the twelfth century. We are told that kings wore sapphires around their necks as a protection against harm or danger.

Many must have been the uses of these stones, for they were con-

sidered a cure for all diseases of the eyes upon application, and also a remedy for boils and tumors.

The sight of a star sapphire was believed to bring the best of luck to an observer and ward off all attempts of witchcraft against its wearer.

In the Morgan-Tiffany collection can be seen quite an unusual star sapphire of 543 carats' weight, called the star of India, said to be about three hundred years old.

Beryl.

This mineral species includes, besides its most important variety emerald, aquamarine and other precious stones, generally called by jewelers, beryl.

Beryl in its crystalline form is hexagonal, and has a tendency

towards six-sided prisms, with smooth faces terminated, in the case of emerald, by a single plane at right angles to the faces of the prisms known as the basal plane. Chemically, beryl is a silicate of the metals aluminum and beryllium.

Its degree of hardness is represented in the standard scale as seven and one-half, which is a little below topaz, but the variety emerald is, however, somewhat harder than the others, especially the Oriental emerald, which, as in the case of the Oriental sapphire, represents the highest standard of color, lustre and transparency.

The beautiful greens of beryl are probably due to a small quantity of chromium, some early authorities attributing it to organic matter, an idea which has been gradually elim-

inated by the knowledge that the crystal when strongly heated still retains its green color.

Emerald is the name given to the variety of beryl of pure and intense green color, usually alluded to as "emerald green," the many shades or tones of which will be described in the following pages.

Emeralds.

Compared with other precious stones the emerald, in its mode of occurrence, is unique, for it is found in the rock in which it was formed. It is found in many places embedded in mica schists and other rocks of the same character. Unlike diamonds, sapphires and rubies, etc., it never occurs in gem gravels.

The knowledge of emeralds, and

a proper conception of their value, has come down to us from a very ancient period. They frequently appear in ornaments found on mummies, and their use in Egypt dates back to the oldest of recorded times.

Among the earliest known localities where emeralds were found was doubtless that in upper Egypt, not far from the coast of the Red Sea and south of Kosseir. This locality in the course of time was abandoned, also forgotten, and old accounts of it were considered erroneous, until the mines were rediscovered in the early part of the nineteenth century, on an expedition organized by Mehemet Ali Pasha. Here have been found tools and other appliances dating back to the days of Sesostris (about 1650 B.C.).

Ancient inscriptions state that Greek miners were employed in these mines during the reign of Alexander the Great. The mines must also have been worked during Cleopatra's time, as she used emeralds, bearing an engraving of herself, for gifts or display. Twelve years ago these mines, located near Jebel Zabara, were again operated, having been shut down since shortly after their rediscovery, in the early part of the last century. Here the stones are found embedded in mica schist.

Some writers tell us that fine emeralds, cut in the rough, together with other gems, have been washed up by the sea on the beach near Alexandria, being, no doubt, a part of a sunken treasure. It is thought that these stones came originally

from the ancient Upper Egyptian mines, just mentioned, as they bore the same characteristics as stones from that locality.

The next locality in point of antiquity is that in South America, discovered by the Spaniards about 1537. At one time this section proved to be the most important of all the emerald-bearing deposits, in quality as well as quantity. One of the purposes that led the Spaniards under Cortez to South America was to secure emeralds, many of which they had found in the possession of the natives of Mexico, who used them for adornment and the embellishing of their idols.

On the arrival of the Spaniards in Colombia or New Granada, their first knowledge of the existence of the Colombian emerald deposits was

the offering of these gems as a gift by the natives, the source of this supply being eventually revealed after considerable search.

These deposits were located at a place named Somondoco, about twenty-three miles from Guateque, with surroundings of such a wild and inaccessible nature that the Spaniards were forced to abandon the workings in spite of their great value.

When the Spaniards first invaded South America they found many large and beautiful emeralds in the possession of the Peruvians, and although deposits were never discovered, the introduction of these stones into Europe led to the use of the prefix "Peruvian" or "Spanish" to distinguish any beautiful emerald. The supposition is that stones used

by the natives of Venezuela, Peru and Ecuador were all derived from the Colombian deposits.

About 1558 was discovered the locality which eventually became and has since been the most important emerald district in the world. This lies about one hundred miles distant from the original Spanish workings, and is situated about seventy-five miles northwest of Bogota, in the country of the wild Muzo Indians, whose resistance to the Spanish conquest proved so successful for a long time. Since the latter part of the sixteenth century this district has produced the majority of the fine emeralds marketed in Europe.

At the present day the mines situated three and one-half miles west of Muzo are the most pro-

ductive, and have been worked at various periods by the Colombian government, natives or European companies. The government now leases the mines to the highest bidder for terms of seven or more years.

Emeralds occur in South America in somewhat horizontal veins embedded in calcite, which is either dark and bituminous or clear like Iceland-spar. Associated with it are crystals of iron pyrites and also quartz, some green and others water clear. While the gems are usually of a fine dark green color, pale as well as almost black stones are found, the latter being noted for their velvety lustre. For trade purposes they are classified according to their transparency and depth of color ; those suitable for

gems are known as "cañutillos," and the poorer stones as "moral-lion."

Situated in an almost inaccessible region, the mine at Muzo is operated by a company who pay an annual rent to the government for the privilege, employing about one hundred and twenty-five men. This mine has the form of a tunnel about one hundred yards deep, with walls that slope considerably. Near the mouth of the mine, on the mountain summit, are situated large lakes, whose waters are controlled by water gates, which are opened when the miners want water.

The shifting of the water gates allows the waters to rush in a great torrent down the walls of the mine, to be, on reaching the bottom of it, conducted by an underground canal

through the mountain into a basin. In the search for emeralds, at such spots where they think they are likely to occur, it is first necessary for the workmen to cut steps in the sloping walls of the mine, so that they will have a good purchase for their feet while they are loosening up the blocks and fragments of rock, which fall by their own weight to the bottom of the mine. After this is about filled up the waters are allowed to rush down with all the force possible, carrying the loosened stones with them along the canal and into the basin. This method is repeated until the beds containing the emeralds are exposed, their presence being usually indicated by green quartz crystals.

In the Ural Mountains, on the right bank of the Takovaya River,

forty-five miles east of Ekaterinburg, is located the next emerald deposit of importance, after that of United States of Colombia.

The discovery of this locality in 1830 was brought about by a peasant finding a few green stones among the roots of a tree torn up by the wind. These stones eventually found their way to Ekaterinburg, at which place was situated the gem-cutting works founded about 1755 by Catherine the Second of Russia, and where many fine gems were and still are cut.

When the value of the find became known, the vicinity was carefully examined and a mine opened, whose yield for a long period consisted of a quantity of good stones, although the production gradually fell off to almost nothing. Owing to the

scarcity and increased value of emeralds these deposits have recently been worked with greater activity than ever.

The mode of occurrence in the Urals is about the same as that in Egypt, the stones being embedded in mica schist, either singly or in groups. Uralian emeralds of the finest quality are quite equal in transparency and beauty of color to South American stones, but in this as well as in other localities perfect crystals are rare. In many cases they are somewhat fissured and opaque, and the color often too pale or unevenly distributed. In size the emeralds in the Urals exceed those of South America and other localities. Some of the largest have been found with a length of fifteen inches and a thickness of

about nine inches, but they are not, as a rule, of good quality. In St. Petersburg, at the Imperial Institute of Mines, are preserved a number of large stones from these mines. The largest is, however, in the possession of the Czar of Russia.

While emeralds are found in Austria and Australia to some extent, it is in Alexander County, N. C., that the only other locality of any importance exists. Fine specimens have been produced from these workings, which, though shut down for a time, are now in operation.

The products of any of the mines just mentioned cannot, on the whole, compare with the stones of South America in beautiful color and other qualities.

Prized above all other shades of

green characteristic of the emerald, and unrivalled in depth and brilliancy, is that intense fresh green color, often compared with that seen in a meadow in spring. All stones from this shade to a dark velvety green are greatly valued, especially when they possess a peculiar velvety lustre like that of some sapphires. While the usual shade of color seen in emeralds is alluded to as emerald green, there are other shades, such as grass green, sea green, green slightly tinged with yellow, and of less importance, and pale stones of greenish white. In artificial light the emerald, unlike some green stones, retains its purity of color.

When compared with other precious stones the rarity of perfect specimens of emerald is unique as they

are frequently seen to have numerous minute internal fissures. Stones clouded with these fissures are often described as "mossy." Flawless emeralds of large size are extremely rare, and only small stones are available for cutting as gems. The difference in value between a perfect and an imperfect emerald of a fine color is enormous, especially should the stone weigh several carats, as such specimens are so rare that almost any price will be given for it by collectors. Many emeralds of large size have been known, but their quality leaves much to be desired.

Due to the ever-increasing demand and the essentially restricted supply the cost to-day of emeralds of good quality is greater than ever before; in fact, these gems have

always been and will continue to be valued highly by people of wealth and good taste.

In the cutting of an emerald, the form applied depends, to a great extent, on the character of the rough stone; for instance, a mixed cut may be used or a pure step cut; in fact, the brilliant and plain table cuts used for diamonds or other precious stones are also employed. The table and step cuts seem to have been utilized to the greatest extent.

Emeralds with much depth of color only require a somewhat shallow form of cutting, but those of the pale shades must be given as good a depth as possible to develop a stronger and finer color effect. Some stones are also cut *en cabochon*, but not as many as in the case of the sapphire and ruby.

When consulting the earliest of records one finds that emeralds were always highly prized for their supposed curative properties and talismanic uses ; in fact, the belief in their value for almost all the human ills seems to have been general. Many are the stories that have come down to us about this or that noted case having been successfully treated by the use of these stones.

Early writers stated that all diseases of the eyes were helped by the application of emeralds, possibly on account of the soothing effect of its green color, being the same as that seen in nature, which exerts such a restful and soothing effect on tired or strained eyes.

Some believed that these gems by changing color revealed the inconstancy of lovers, and would

also ward off all enchantments or attacks by witches or magicians. Others even considered them of immense value against an enemy in battle, and of great influence in making the possessor more energetic, clear of mind and eloquent of speech. Besides sharpening one's wits, emeralds strengthened the memory and bestowed riches upon the wearer. A curious emerald of a deep green color, weighing 78 carats, has lately been exhibited in Europe ; it is a talismanic stone, having a Persian inscription engraved around its edge. Engraved stones were used as talismans by the ancients, but not frequently, as they were, as a rule, valued too highly to mar their surface and beautiful appearance.

There have been many descriptions of the large emeralds seen in

the past, but the largest and best known one of the present day is that owned by the Duke of Devonshire, which was found in the mines at Muzo in United States of Colombia. This weighs about 1,350 carats, and is an almost flawless, uncut six-sided crystal, two inches long, of the same diameter, having a fine color and good transparency.

Ruby.

Ruby, or red corundum, is generally found under the same conditions as its more precious variety, the blue, or sapphire. The mother-rock of the ruby is a white granular limestone or marble, and in this, as also in the débris from its weathering, are the precious gems found. While ruby of poor quality occurs in many localities, clear, transparent

crystals, suitable for cutting, are distributed in but a few countries, of which Burma, Siam and Ceylon have been of most importance.

Upper Burma has furnished us with the finest as well as the largest quantity of rubies since the fifteenth century, and at the present day over one-half the world's supply comes from this locality. When found embedded in its original matrix, the ruby has always a regular and well-developed crystalline form, usually of that of a somewhat flat rhombohedral crystal.

For many years the exact location of these mines was kept a secret by the Burmese, but this condition was changed when the English annexed this country, and part of the workings were taken over by Europeans. The district of Mogok,

embracing an area of about fifty square miles, is the most important in Burma, although the ruby-bearing area in this country is said to cover almost four hundred square miles.

It is not in the masses of crystallized limestones in this district that the gems are abundantly found, but in the clayey and sandy weathered product of the mother-rock, called "byon," which lies on the sides of the hills and fills up the bottoms of valleys. From the alluvial deposits of the river valleys, which consist of the brown or yellow, firm, clayey, and at times sandy "byon," the greater part of the yield is derived. Mogok, for instance, the richest section of all, lies in such a valley of this formation.

The "byon" lies about fifteen to twenty feet below the surface of the floor of the valley, and anywhere from five feet to only a matter of inches in thickness. On the sides of the hills the veins or beds of "byon" may run from fifteen feet to as much as fifty feet in thickness.

Before the annexation of Burma, persons desirous of mining rubies, were compelled to obtain a license before beginning any work, and besides paying a tax were forced to hand over to the king all stones above a certain size and 1,000 rupees in value. As the question of reward for the finder in this instance depended on the fancy of the sovereign, many large and valuable stones were either broken into small pieces, in order to evade the contract, or

secretly sold. One of the many titles used by the King of Burma was "Lord of the Rubies."

In the earlier periods of mining, the work of excavating in the valleys could only be undertaken during the dry season. Here small parties of three or four men, working together, would sink a pit usually about four feet in diameter through the surface of the gem-bearing gravel. This they removed in baskets, leaving undisturbed all large rocks too heavy to carry. The mines employed about two hundred men, whose work consisted of excavating and carrying out the "byon" to be washed and its residue carefully gone over for gems. Horizontal galleries were driven from one pit to another in order to secure all the gem-bearing

"byon" possible. Very different methods were used when reaching ruby-bearing layers on the sides of the hills, the open cuttings or trenches excavated being worked by means of running water brought in bamboo pipes, often from some distance. This flow of water was used to wash away the upper mass of débris and clayey or light part of the "byon," leaving the heavier gems behind. On account of the large volume of water necessary, this type of mining was carried on during the rainy season.

After the control of the mines around Mogok was taken away from the natives, about 1886, they were worked on a large scale, at first by an Anglo-Italian and afterwards by an English company, known at present by the name of the "Burma

Ruby Mines, Ltd." In return for this concession of mining rights the company pays a large sum per annum to the Indian government. For many years these mines did not prove as profitable as expected, but a change for the better was made some time ago by the introduction of machinery for washing the "by-on" more quickly and therefore more cheaply than could be accomplished with the old primitive method of native labor. The introduction of an electrical power plant and such machinery as is used for diamond mining has increased the production of these mines to one-half the world's output, and also has placed the company on a better paying basis. While the district around Mogok is situated at a high altitude, it has always proven a

most unhealthy climate for Europeans.

Rubies from the Upper Burma mines are noted for their deep rich coloring, and it is here that the most admired and coveted of all, the beautiful carmine red, known as "pigeon's blood" color, are obtained.

Second in importance to the Burmese deposits are those of Siam. There good rubies generally darker in color than those of Burma are found in large quantities around Bangkok, Krat and Chantabun. Some of these stones compare favorably with those of India, but the majority are darker and more purple in color. They are found in the weathered sands of this region and were originally mined by the same methods that were in use in Burma.

Several years ago, after a careful investigation into their resources, the working of these deposits was pursued by an English company with greater energy and more system than ever.

In Ceylon the ruby occurs in sands of alluvial nature, together with many sapphires and other precious stones. The old river terraces at the foot of Adams Peak produce the best rubies on this island, supplying stones in some cases as beautiful as those of Burma. This, however, is not the rule with the majority of the output, which, while very clear and transparent, are of a pale color and therefore less valuable.

Other countries, such as Australia and the United States, produce rubies to some extent, but their sup-

plies do not compare in any wise with those just mentioned.

In Afghanistan, about thirty-two miles east of Kabul, are situated the ruby mining concessions granted by the Amir. The rubies from this section are very much like those of Burma.

Among the earliest of ruby mines are those of Badakshan, which are said to have supplied the beautiful stones possessed by the Great Mogul.

The name ruby, derived from the latin word ruber, which means red, was used for most all red stones in olden days, but the genuine precious red corundum has always held a foremost place in the estimation of people who appreciate the beautiful. As a matter of course, the value of rubies, like sapphires and em-

eralds, has ever been regulated by the color and transparency. This is particularly true of certain shades of color in these gems, the beauty and scarcity of which make them of double interest, and so highly prized that the demand is bound to be greater than the supply. There are many different tones of color in the various specimens, running anywhere from the pale or light shades, known as "feminine," to the dark blood reds called "masculine." Lighter shades vary from a pale rose red to reddish white, and those of the darker colorings from red to carmine or dark blood red. All these reds have, however, a slight tinge of blue or violet. The deep, pure, carmine-red shade is the most admired of all, and has been compared by the Burmese to that of the

blood of a freshly killed pigeon, commonly known as "pigeon's blood red." A faultless stone of this particular color, when combined with a fine lustre and transparency, has always been of great value. It is from Burma that most of the "pigeon's blood" rubies come.

Fine deeply colored rubies of 3 or more carats are quite rare, for while larger stones are found they are, as a rule, pale of color. Rubies as large as 10 carats scarcely ever occur. The coloring of rubies is not always uniform, colorless layers being sometimes placed between portions colored red. Other faults more commonly met with are a lack of clearness, existence of cloudy portions, small internal fissures, or unequal distribution of color. As in the case of sapphires, the pre-

vailing opinion is that the beautiful coloring of these stones is due to the presence of chromium or iron.

The various shades of red of the ruby lose none of their beauty in artificial light, which is remarkable, as this cannot be said of other stones of the same color. Ruby, unlike some other varieties of precious corundum, does not lose its color after being subjected to a great heat. It does, however, while cooling, become first white then green before finally regaining its original red color, thus showing that the coloring matter is not of organic nature.

Some rubies show on their basal plain, or still more plainly when the stone is cut with a round surface, a six-rayed star of glimmering reflected light. These star rubies,

as they are called, have this marking to a much lesser degree than the sapphires, and are not so frequently found. In the first part of this book an explanation of the cause of this stellate appearance is given in the chapter on sapphires.

Owing to the fact that the color of a ruby varies with the direction in which it is seen, it is necessary that the form of the cut gem should bear a certain definite relation to that of the crystal, so as to procure the best color effect. The process used in the cutting of a ruby is the same as that employed for the diamond and other precious stones, accomplished by being first ground on an iron disc and followed by polishing on one of copper. All forms of cutting, such as described under the chapter on sapphires, are em-

ployed in the beautifying of rubies. When using the brilliant form for ruby, it is often cut flatter and thinner than is permissible with a diamond, as this increases its transparency. Due to the same strong refraction that is characteristic of the sapphire, the light rays entering the ruby by its upper facets are totally reflected by the bottom or back facets, receiving their fine red color as they pass through the gem.

As previously stated, rubies of any great size are extremely rare, although some stones as heavy as 50 carats are said to have been found in India and Burma, and it is reported that the King of Ava possessed a ruby mounted as an ear pendant of the size of a small hen's egg. Such large stones as were discovered in the early days were

jealously hoarded by the kings of Burma.

The largest one Ceylon has produced is an uncut stone weighing 42.51 carats, with a decided shade of blue in it.

Although rubies for many years have ranked far above most of the precious stones, there has been a falling off of interest in these gems, due partially to fashion's decree, but principally to the fact that so many imitations have been placed on the market. Why the imitations should affect the interest in these beautiful gems, is incomprehensible, as man's ingenuity and science cannot compete with nature. Just consider, for instance, the fine leathers and woods that are well imitated, and yet the demand for the genuine is as great as ever among

people of discrimination and good taste.

Rubies were well known to the ancients, being often mentioned in the Bible. Among some of the superstitions that surrounded these gems was that of protecting its owner from his enemies and also loss of wealth, provided, however, the stone, if of fine quality, was not brought in contact with one of a poorer character, thereby having its power reduced by reason of the contamination. Many of the talismanic virtues of the ruby were believed to be affected by the way it was mounted, and also by its position when worn. In Burma, where the finest stones have originated, it was not considered sufficient just to wear these gems as ornaments in order to benefit by their virtue,

but they were inserted in the flesh, thus becoming part of the body and making it invulnerable to wounds from any weapon. The ruby when worn as an amulet was supposed to protect the wearer against plagues, poison and evil spirits. It was also believed that if its owner was in danger the stone would appear darker, but upon the passing of the peril, a return to its natural color would occur.